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DETERMINANTS OF PER CAPITA MILITARY EXPENDITURES IN DEVELOPING COUNTRIES

Robert E. Looney

INTRODUCTION

A large descriptive literature of the burden of military expenditures in developing countries has accumulated over the last several years. Understandably, the main thrust of most of this analysis concerns the loss in social welfare associated with increases in military expenditure per capita, i.e., that social expenditures in lieu of military expenditure would have provided more tangible improvements in the quality of life of large groups of individuals in developing countries. Without questioning this view, the analysis below attempts to determine the major factors underlying military expenditure per capita in developing countries.

Surprisingly, no previous studies have attempted to determine whether or not per capita military expenditures were related to anything except per capita income. The usual presumption being that military expenditures are in large part a function of political or strategic factors, with economic variables playing a tangential role.

The departure of this paper is that it attempts to:

1. Verify the validity of Wagner's Law which states that military expenditures per capita increase with increased per capita income;

2. Examine the role of public external debt in affecting military expenditures in developing countries, i.e., did the rapid increase in LDC external borrowing in the 1970s play a significant role;

3. Test the uniformity of military expenditures in developing countries to see whether developing countries as a group experience the same underlying factors which contribute to military expenditures or whether certain patterns of military expenditures are unique to particular sub-groupings of countries;

4. Test the degree to which economic variables alone can account for the differences in per capita military expenditures across a wide group of diverse developing

countries;

Hopefully, answers to these questions will provide new information as to the real burdens of military expenditures in developing countries and the mechanisms through which military expenditures are likely to increase in the future.

FACTOR AND DISCRIMINANT ANALYSIS

With reference to the third question posed above, several studies [1] have indicated that developing countries may lack homogeneity with regard to the impact that defence expenditures have on the overall economic growth of the country. With regard to the impact of defence expenditures on economic growth, Frederiksen and Looney contend that [2]:

> One can argue that under certain circumstances defence spending can help growth while under a different set of circumstances, it can hinder growth. Indeed, both propositions are likely to be true for the same country at different points in time.
>
> On the positive side, defence spending may contribute to the growth of the civilian economy by: (1) feeding, clothing and housing a number of people who would otherwise have to be fed, housed and clothed by the civilian economy, (2) providing education and medical care as well as vocational and technical training, (3) engaging in a variety of public works - roads, dams, river improvements, airports, communication networks, etc - that may in part serve civilian uses, and (4) engaging in scientific and technical specialities which would otherwise have to be performed by civilian personnel.

They add that on the negative side [3]:

> There are at least three different types of possible effects. The first, named the "income shift" by Benoit, is that increases in defence expenditures will reduce the civilian GDP and will thus tend to decrease growth proportionately. Second, it is possible that defence spending adversely affects growth since the government sector for the most part exhibits "negligible rates of measurable productivity increases." Finally, growth can suffer since increased spending on defence uses resources which could have been better employed as civilian investment.

Frederiksen and Looney [4] note that while these arrangements make intuitive sense, the crucial determinant of the impact of defence expenditures on economic growth is the country's financial resource constraint. According to them, a country which is severely resource constrained (i.e., faces some combination of lagging taxes, reduced private and government savings, reduced borrowing power overseas, export shortfalls, etc.) will probably face budget cuts. In order to maintain defence programs, the high growth development programs will be sacrificed [5]:

> This is likely for two reasons. First, it is usually more politically acceptable to curtail capital investment (on infrastructure, for example) than expenditures on the current account. Second, given that a well-established military establishments already exists, there will be the obvious pressure to maintain the status quo. These special interest groups might include high ranking officers, military contractors, and certain political groups. As budgets are reduced, the military share is frozen and the brunt of the deflationary policy is borne by development projects which we assume are relatively productive. In short, defence expenditures are likely to be asymmetric - difficult to cut back but easily expanded. Thus, for resource-constrained countries, we should expect a negative relationship between defence spending and the economic growth.

The authors contend that the opposite is likely to hold for countries with a relative abundance of financial resources - an elastic supply of tax revenues, a high inflow of foreign exchange and the like [6]:

> These countries can more easily afford the capital investment programs necessary for economic growth while maintaining or even increasing defence programs.

They concluded that [7]:

> If this thesis if correct, one can see why previous authors have failed to find any consistency between economic growth and defence. Using a model based on resource constraints, however, it is easy to see why developing countries with identical levels of defence spending can experience very different growth levels: richer countries are apparently able to invest in development programs while, on the other hand, poorer countries have had to sacrifice these programs to pay for defence.

Since their hypothesised relationship between defence and economic growth depended on financial resource constraints, their sample of developing countries was separated into either a resource-constrained or non resource-constrained group by means of cluster analysis. While a large number of conceivable proxy measures could be used to indicate the relative abundance or scarcity of financial resources, the selection of those used in the cluster analysis was based on the ratios of gross domestic investments to GDP in 1960 and 1978 and the ratios of gross domestic savings to GDP in 1960

and 1978. (Data taken from the 1980 World Bank World Development Report.) The cluster analysis produced two distinct groups: one having high levels of savings and investment to GDP, the other having low ratios of savings and investment to GDP.

Linear regression equations were estimated for each group [8]:

> The most striking result and one that supports our hypothesis, is that the coefficient of the defence variable was positive and statistically significant at the 99 per cent level for the richer group. While the coefficient for the defence variables for the poorer group was negative (as hypothesised) it was not statistically different from zero.

Based on the above-cited results it makes sense to split the sample of developing countries into groups based on some measure of resource constraint. Presumably, those countries who have either more domestic resources (savings and investments) or more access to foreign capital (everything else equal, such as gross national product) will be able to support a higher level of defence expenditures. On the other hand, those countries with a lower level of domestic resources or less access to international capital will (everything else equal) not have as high a level of defence expenditures.

Using factor analysis with number of measures of debt and capital flows (Table 1), the main trends in the data were identified and a discriminant analysis [9] was then performed using as variables those with the highest loading on each one of the individual factors. The orthogonal rotation assures that each variable selected had a relatively low degree of correlation with the others in the sample. The variables thus selected for splitting the two groups were:

1. Gross Inflow of Public Loans/Exports 1982
2. Total Public External Debt 1982
3. Gross International Reserves 1982
4. Public External Debt as a percentage of GDP 1982
5. Growth in Imports 1970-82
6. External Debt Service as a percentage of GDP 1982
7. Public External Debt as a percentage of GDP 1970

The results of the discriminant analysis (Table 2) show a

TABLE 1

ORTHOGONALLY ROTATED FACTOR PATTERN : (LOADINGS) ECONOMIC VARIABLES

Variables	Factors						
	1 Facilitating Public Consumption	2 Contributing to 1982 External Debt	3 Gross International Reserves	4 Share of 1982 Public External Debt in GDP	5 Growth in Exports	6 External Debt Service 1982	7 Public External Debt 1970
Gross Inflow Public Loans/Exports 1982	97*	0	-14	8	2	-9	5
Public Debt/Exports 1982	96*	3	-13	2	-4	-13	-6
Resource Balance as % of GDP 1982	94*	11	1	-14	7	7	7
Growth in Public Consumption 1970-82	92*	3	-5	4	26	-7	2
Public External Borrowing Commitments/Exports 1982	91*	-4	-13	8	12	-11	23
Gross Inflow Public Loans/GDP 1982	86*	7	-8	-2	-11	-13	-25
Public Consumption as % of GDP 1982	63*	-5	-9	55	-13	-5	27
Growth in Private Consumption 1970-1982	62*	12	10	1	48	8	2
Private Consumption as % of GDP 1960	-72*	7	-15	-16	1	-13	-44
Private Consumption as % of GDP 1982	-82*	-15	-16	-28	-11	-19	-10
Terms of Trade 1982	-83*	21	21	9	10	17	-5
Total Public External Debt 1982	0	94*	11	0	20	20	-4
Gross Inflow Public Loans 1970	14	92*	20	-7	-18	-7	9
Interest Payments on External Debt 1970	9	90*	13	-16	-20	2	-10
Repayment of Principal on Public Loans '82	4	89*	10	-11	-15	12	-17
Gross Inflow Public Loans 1982	-5	88*	10	1	29	28	-11
Public Ext.Borrowing Commitments 1982	-6	85*	14	-4	34	18	-4
Interest Payments on External Debt 1982	-6	82*	6	2	30	38	-8
Total Public External Debt 1970	15	80*	19	-14	-23	-30	10
Net Inflow of Public External Loans 1970	19	77*	23	-2	-17	-19	25
Repay.of Principal on Ext.Loans 1982	-4	73*	21	5	31	37	7
Growth in Exports 1970-82	-2	39*	25	3	5	-8	-36
Current Account Balance 1970	15	-80*	-1	-6	-29	1	10
Gross International Reserves 1982	-8	19	89*	-11	9	-7	9
Gross International Reserves 1970	-8	29	85*	-5	-7	1	-6
Average Maturity of Public Ext.Debt	23	-18	-48*	5	-11	-43	23
Current Account Balance 1982	13	-26	-59*	10	-22	0	21
Public External Debt as % of GDP 1982	9	-9	-29	76*	-15	12	17
Exports as % of GDP 1982	-8	-8	7	76*	4	22	5
Growth in Exports 1960-1970	8	2	-6	67*	7	-27	-24
Public Consumption as % of GDP 1960	47	-11	-12	55*	20	-18	37
External Debt Service as % of GDP 1982	-8	27	-7	5	-6	59*	7
Public External Debt as % of GDP 1970	50	0	-23	20	5	-1	55*

Note: All military variables together with Gross Domestic Product and per capita income are omitted.

TABLE 2

DISCRIMINANT ANALYSIS TOTAL SAMPLE COUNTRIES BASED ON ECONOMIC FACTOR ANALYSIS HIGH LOADINGS

Group I		Group II	
Country	Probability of Correct Placement	Country	Probability of Correct Placement
1 Israel	69·34	1 Greece	57·78
2 Honduras	83·48	2 India	84·91
3 Cameroon	60·73	3 Nigeria	89·07
4 Sudan	66·47	4 Indonesia	90·67
5 Costa Rica	92·64	5 Egypt	68·20
6 Bolivia	86·27	6 Korea	89·95
7 Somalia	86·46	7 Rwanda	69·08
8 Tunisia	68·31	8 Turkey	66·95
9 Morocco	73·06	9 Spain	51·89
10 Guatemala	54·91	10 Venezuela	80·26
11 Malawi	91·40	11 Mexico	99·69
12 El Salvador	65·90	12 Brazil	99·02
13 Mali	97·12	13 Algeria	76·44
14 Pakistan	86·98	14 Philippines	55·78
15 Paraguay	60·02	15 Libya	75·69
16 Ecuador	56·61	16 Colombia	54·63
17 Dominican Republic	74·12	17 Thailand	60·95
18 Liberia	94·77	18 Malayasia	65·16
19 Ivory Coast	84·42	19 Argentina	66·09
20 Mauritania	96·04	20 Saudi Arabia	94·65
21 Sierra Leone	86·05	21 Kuwait	81·31
22 Panama	94·37	22 Syria	63·95
23 Chile	70·09	23 Jordan	50·81
24 Chad	87·18		
25 Uruguay	67·87		
26 Tanzania	79·87		
27 Uganda	88·76		
28 Ethiopia	70·24		
29 Cen. African Rep.	76·89		
30 Ghana	78·72		
31 Burma	82·91		
32 Sri Lanka	75·39		
33 Jamaica	90·66		
34 Trinidad	77·62		
35 Zambia	95·88		
36 Peru	71·67		
37 Zimbabwe	85·68		
38 Kenya	86·61		

high degree of probability of correct placement in e group, i.e., the discriminating variables selected from factor analysis are able to split the sample countries i two fairly distinct groupings based largely on the exter debt situation facing each set of countries. The Group countries consist of several major oil exporters and seve of the more dynamic newly industrialising nations such Mexico, Greece, India, Korea, Spain, Algeria and Malays Group I countries in general seem to be the poorer, le economically dynamic nations, this group being heavi weighted with African and poorer Latin American countries.

Further insight into the two groups can be gained examining the means of the variables used in t discriminant analysis:

1. Group I countries resorted to a much higher (3.6 time inflow of external public loans in 1982 relative their exports that year;

2. On the other hand, the overall level of total publ external debt in 1982 averages nearly four and one ha times as much for Group II countries as is the case f Group I countries;

3. The level of international reserves is also much highe for Group II countries - nearly 10 times as much as th average for Group I countries;

4. With regard to shares of debt in gross domestic produc however, Group I countries have much higher levels o attainment, averaging nearly twice as much as Group I countries in both 1970 and 1982. The debt servic ratio to exports is correspondingly higher for Group countries.

5. The rate of growth of imports was nearly ten time higher over the 1970-82 period for Group II countries.

In terms of profiles, therefore, the Group II countries are considerably larger, more affluent, and less reliant on external debt as a percentage of gross domestic product. They tend to spend relatively large amounts on military activities, but not on necessarily significantly greater amounts of their overall budgets.

ANALYSIS OF PER CAPITA MILITARY EXPENDITURES

The per capita military expenditure measure of military expenditure also confirmed the splitting of the developing country sample into two groups based on common economic environment. A factor analysis of the total sample of countries showed that per capita military expenditure loaded only moderately on one factor

TABLE 3

OBLIQUE ROTATED FACTOR PATTERN: ECONOMIC VARIABLES, MILITARY EXPENDITURES PER CAPITA, TOTAL COUNTRY SAMPLE

	Factors						
Variables	1 Factors Affecting Total External Debt 1982	2 Public Consumption Share GDP 1982	3 International Reserve	4 External Debt/ Exports 1982	5 Growth in Consumption	6 Debt Service as % of Exports 1982	7 Military Expenditure Per Capita 1981
Repayment of Principal on Public External Loans 1970	100*	-1	-5	0	-26	9	-10
Interest Payments on External Debt 1970	100*	-7	-3	5	-23	1	-4
Gross Inflow Public Loans 1970	94*	-4	1	3	-6	1	29
Total External Debt 1982	94*	2	-1	3	11	16	3
Gross Inflow External Loans 1982	89*	6	-3	1	14	17	-13
Public External Borrowing Commitments 1982	85*	0	-4	6	26	7	-8
Total Public External Debt 1970	83*	-9	-3	6	-8	-17	34
Interest Payments on Exter.Debt 1982	82*	3	0	0	11	29	-11
Net INflow Public Exter.Loans 1970	73*	-6	7	4	9	-4	54
Repayment of Prin.Extern.Loans 1970	60*	0	15	-3	27	37	13
Gross Domestic Product 1982	56*	-11	39	-1	8	-27	-19
Growth of Exports 1970-82	43*	22	3	-38	-18	-14	-4
Current Account Balance 1970	-86*	-13	14	8	-8	0	-10
Growth in Exports 1960-70	15	89*	-16	-9	5	-43	-9
Gross Inflow Public Loans/GDP 1982	6	84*	0	26	-2	0	-10
Public Consumption as % GDP 1982	-1	79*	20	0	-19	5	21
External Public Debt % GDP 1982	4	76*	-12	15	-8	14	8
Exports % GDP 1982	-10	72*	20	-9	8	21	0
Public Consumption % GDP 1960	-10	67*	-5	-11	16	-10	36
Resource Balance % GDP 1982	21	-55*	12	-23	-9	56	-3
Gross National Product per Capita 1982	-7	6	86*	0	-13	14	10
Gross International Reserves 1982	-4	-14	84*	-1	16	-23	5
Gross International Reserves 1970	17	0	77*	-10	-10	-21	-17
Current Account Balance 1982	-19	0	-46*	8	-13	27	27
Private Consumption as % GDP 1960	22	-9	-62*	-5	5	-27	-6
Average Maturity Public Extern.Debt 1982	-2	4	-67*	-9	0	-25	28
Public External Borrowing Commitments/ Exports 1982	2	2	-2	95*	3	-18	-10
Gross Inflow Public External Loans/ Exports 1982	5	14	11	88*	-7	3	-13
Total Public External Debt/Exports 1982	5	1	-6	88*	-2	-3	7
Growth in Private Consumption 1970-82	-12	-12	8	21	87*	8	14
Growth in Imports 1970-82	10	-3	-2	-10	80*	-20	-9
Growth in Public Consumption 1970/82	0	8	-25	-20	67*	1	-16
Terms of Trade 1982	23	18	24	6	49*	7	18
Debt Service % Exports 1982	20	-2	-4	-3	-2	73*	22
Private Consumption % GDP 1982	-12	-35	-35	4	-24	-38*	-4
Public External Debt % GDP 1970	-4	3	-26	-3	6	31	61*
Military Expenditures per Capita 1981	7	30	35	-10	-17	9	54*

TABLE 4

OBLIQUE ROTATED FACTOR PATTERN: ECONOMIC VARIABLES, MILITARY EXPENDITURES PER CAPITA, GROUP 1 COUNTRIES

	Factors						
Variables	1 Determinants of Military Expenditure per Capita 1981	2 Public Consumption as % GDP	3 Repayment of Public External Debt 1970	4 Public Debt/ Exports 1982	5 Growth in Public Consumption	6 Growth in Private Consumption	7 Public External Debt % GDP 1970
Military Expenditure per Capita 1981	100*	7	-35	-2	-11	0	2
Net Inflow Public Ext.Loans 1970	96*	8	10	2	-9	-1	27
Total Public External Debt 1982	94*	-2	-6	14	10	12	2
Gross International Reserves 1982	92*	-4	5	-11	-14	6	-10
Gross National Prod.per Capital 1982	89*	-13	-12	14	5	-4	0
Total Public External Debt 1970	86*	4	16	-3	-10	-5	26
Gross Inflow Public Loans 1970	83*	8	41	2	-7	-1	27
Interest Payments on Extern.Debt 1982	82*	-3	6	1	34	7	-2
Repayment of Principal on Public External Loans 1982	78*	-3	4	0	28	13	-22
Gross International Reserves 1970	75*	-9	12	-18	0	-12	-30
Gross Inflow Public Extern.Loans 1982	71*	2	24	12	15	5	-25
Public Extern.Borrowing Commitments	69*	0	23	10	9	9	-32
Gross Domestic Product 1982	53*	-33	27	-6	-7	-14	-1
Current Account Balance 1982	-10*	0	-29	5	7	-8	14
Current ACcount Balance 1970	-87*	0	51	3	2	14	-17
Growth in Exports 1960-70	-22	95*	8	-4	-5	1	3
Gross Inflow Public Ext.Loans/GDP 1982	-13	85*	19	19	16	-5	-17
Public Debt as % GDP 1982	-12	83*	7	10	26	-6	7
Public Consumption as % GDP 1960	10	82*	-12	-10	-22	20	-1
Public Consumption as % GDP 1982	42	68*	-10	4	15	-21	-2
Exports as % GDP 1982	5	65*	3	0	49	-20	0
Resource Balance as % GDP 1982	0	-71*	12	-16	53	-12	16
Repayment of Principal on Public External Loans 1970	17	5	99*	1	0	-1	15
Interest Payments on Public Ext.Debt 1970	21	9	95*	-1	-3	-7	15
Average Maturity of Public Ext.Debt 1982	-10	11	45*	26	-23	0	13
Public Debt/Exports 1982	4	1	0	94*	-15	10	23
Public Borrowing Commitments/exports 1982	2	6	4	93*	-26	11	17
Gross Inflow Public Ext.Loans/Exports '82	0	8	11	89*	1	-4	-4
Growth of Exports 1970-82	36	14	22	-41*	-16	19	-9
Growth of Public Consumption 1970-82	-32	9	-11	-21	70*	24	9
Debt Service Public External Debt as % Exports 1982	17	-3	16	-16	69*	21	-4
Private Consumption % GDP 1982	-13	-29	2	-2	-79*	-3	-8
Growth of Exports 1970-82	0	5	74	-2	14	85*	23
Growth of Private Consumption 1970-82	13	-14	-21	39	15	82*	22
Terms of Trade 1982	6	49	-13	-4	28	47*	1
Private Consumption as % GDP 1960	-33	-18	21	8	3	24	72*
Public External Debt % GDP 1970	38	7	3	-5	15	24	59*

TABLE 5

OBLIQUE ROTATED FACTOR PATTERN: ECONOMIC VARIABLES, MILITARY EXPENDITURE PER CAPITA, GROUP II COUNTRIES

Variables	Factors 1 Determinants of External Debt 1982	2 Public External Borrowing Commitments 1982	3 Determinants of Military Expenditure per capita 1981	4 Growth in Public Consumption	5 Public External Debt 1970	6 Growth in Exports
Interest Payments on Ext.Public Debt	100*	-6	2	10	-15	-4
Gross Inflow Public Loans 1982	100*	0	2	17	-5	7
Total Public External Debt 1982	94*	-1	3	4	15	4
Public External Borrowing Commitments 1982	93*	2	-3	34	7	1
Repayment of Principal on Public External Debt 1970	76*	3	-4	-38	15	15
Int.Payments on Ext.Public Debt 1970	69*	3	-14	-36	26	7
Repay.of Prin.on Public Ext.Debt 1982	69*	-13	35	20	20	-11
Debt Service on External Debt as % Exports 1982	69*	9	30	-13	-5	-32
Resource Balance % GDP 1982	58*	-35	9	-19	16	-14
Current Account Balance 1970	-88*	-4	11	-12	-5	-28
Public Ext.Borrowing Commit./Exports '82	0	82*	-21	-1	1	-15
Average Maturity Pub.Ext.Debt 1982	-42	77*	-8	1	29	9
Public External Debt/Exports 1982	27	69*	-1	-45	19	-13
Gross Inflow Public Loans//xports 1982	31	66*	8	-33	-12	-9
Terms of Trade 1982	43	-51*	2	26	22	-18
Gross Domestic Product 1982	45	-59*	-48	-10	17	9
GNP Per Capita 1982	3	-71*	18	-36	-28	-1
Gross International Reserves 1982	-32	-73*	-13	-14	29	-24
Gross International Reserves 1970	0	-77*	-16	-39	1	9
Public Consumption as % GDP 1960	-26	-8	30*	17	34	17
Public External Debt % GDP 1970	47	26	77*	0	6	0
Exports % GDP 1982	3	-23	68*	31	-9	28
Gross Inflow PUblic Ext.Loans/GDP 1982	38	21	66*	14	-17	14
Public Consumption % GDP 1982	-19	6	60*	-23	-25	12
Military Expend. Per Capita 1981	-9	-31	57*	-39	-14	32
Current Account Balance 1982	-23	44	48*	-9	43	-2
Private Consumption as % GDP 1982	-21	20	-71*	4	-9	22
Growth in Imports 1970-82	17	6	-13	88*	-8	-4
Public Consumption Growth 1970-82	-2	35	0	81*	7	0
Private Consumption Growth 1970-82	14	-12	37	71*	12	-19
Net Inflow Public External Loans 1970	20	1	0	3	90*	1
Total Public External Loans 1970	19	6	-18	-18	75*	11
Public External Debt % GDP 1970	8	11	35	32	70*	10
Gross Inflow Public Ext. Loans 1970	52	2	-2	-17	63*	8
Growth in Exports 1960-70	-7	-6	24	1	12	84*
Growth in Exports 1970-82	21	-7	20	-34	1	82*
Private Consumption % GDP 1982	13	29	-47*	18	3	59*

TABLE 6

DETERMINANTS OF MILITARY EXPENDITURE PER CAPITA, TOTAL COUNTRY SAMPLE, ECONOMIC VARIABLES

(Standardised Estimates)

Equation	(MEP81)			Independent Variables						Statistics		
	GNPPER	CAB	PCB	ECNIA	PDPB	EGB	GDPB	GEDB	GDB	PDB	r^2	F	DF
1	0·32 (4·42)	0·75 (10·15)											
2	0·29 (4·60)	0·75 (12·06)	0·21 (3·41)								·730	67.84	52
3	0·28 (4·98)	0·79 (13·82)	0·22 (3·84)	0·19 (3·38)							·834	72·12	46
4	0·23 (3·94)	0·76 (13·47)	0·31 (4·39)	0·17 (3·21)	-0·14 (-2·06)						·869	70·06	46
5	0·26 (4·52)	0·77 (14·27)	0·29 (4·40)	0·14 (2·66)	-0·12 (-1·86)	0·12 (2·29)					·882	61·22	46
6	0·28 (4·78)	0·78 (12·20)	0·22 (3·23)	0·17 (2·41)			0·03 (0·43)				·896	57·19	46
7	0·63 (7·71)		0·29 (3·09)					0·33 (3·66)			·870	55·08	46
8	0·83 (4·91)		0·30 (2·56)						-0·28 (-1·66)		·787	40·83	36
9	0·28 (4·67)	0·78 (12·71)	0·22 (3·69)							0·13 (2·11)	·697	27·71	39
10	0·22 (3·61)	0·75 (12·51)	0·33 (4·43)		-0·17 (-2·26)					0·12 (2·13)	·850	59·51	46
											·866	53·36	46

Notes: See text for definition of variables
( ) = t statistic
r^2 = correlation coefficient
F = F statistic
DF = degrees of freedom

TABLE 7

MILITARY EXPENDITURES PER CAPITA, GROUP II COUNTRIES

Country	Actual	Predicted	Actual/ Predicted	Placement
1. Rwanda	3·962	164·274	·0241	Below
2. India	7·360	64·386	·1143	Below
3. Columbia	13·759	110·325	·1247	Below
4. Indonesia	18·581	147·319	·1261	Below
5. Mexico	16·634	110·519	·1505	Below
6. Thailand	27·413	136·867	·2003	Below
7. Philippines	16·792	52·817	·3179	Below
8. Algeria	91·959	222·219	·4138	Below
9. Venezuela	62·663	130·375	·4806	Below
10. Spain	96·693	133·193	·7260	Below
11. Argentina	111·010	127·112	·8733	Below
12. Kuwait	836·000	870·248	·9606	
13. Korea	103·666	105·488	·9827	
14. Saudia Arabia	2110·000	1956·000	1·0787	Above
15. Malaysia	101·119	74·901	1·3500	Above
16. Greece	265·773	194·039	1·3697	Above
17. Jordon	273·125	189·901	1·4382	Above
18. Syria	267·802	183·639	1·4583	Above

Notes:
Based on regression equation : MEP81 = 0·21 GNPPER + 0·91CAB

Below = Countries whose Actual is less than 95% of Predicted value
Above = Countries whose Actual is greater than 105% of Predicted value

TABLE 8

DETERMINANTS OF MILITARY EXPENDITURE PER CAPITA, GROUP 1 COUNTRIES, ECONOMIC VARIABLES

(Standardised Estimates)

Equation	(MEP81)			Independent Variables							Statistics		
	GNPPER	GDB	PCB	GEDB	ECNIA	PDB	ECNIB	CAB	PBCB	GDP	r^2	F	DF
1	0·54										·291	13·14	33
	(3·63)												
2	0·58	-0·46									·505	13·28	28
	(4·22)	(-3·39)											
3	0·74	-0·24	0·09								·782	26·34	25
	(6·43)	(-2·93)	(0·64)										
4	0·56	-0·44		0·46							·807	30·75	25
	(5·99)	(-4·65)		(4·87)									
5	0·38	-0·30		0·32	0·40						·885	40·64	25
	(4·39)	(-3·44)		(3·74)	(3·77)								
6	0·45	-·31		0·37		0·29					·850	29·82	25
	(4·63)	(-3·10)		(3·94)		(2·45)							
7	0·37	-0·30		0·31	0·48		-0·13				·896	34·56	25
	(4·36)	(-3·64)		(3·72)	(4·09)		(-1·64)						
8	0·44							-0·38			·424	11·05	32
	(3·13							(-2·64)					
9	0·25	-0·22			0·67				-0·04		·788	22·32	28
	(2·65)	(-2·14)			(4·67)				(-0·35)				
10	0·52	-0·47								0·28	·580	11·52	28
	(3·94)	(-3·65)								(2·11)			

Notes: See text for definition of variables
( ) = t statistic
r^2 = correlation coefficient
F = F statistic
DF = degrees of freedom

just a single variable, public external debt as a per cent of gross domestic product in 1970. In sharp contrast, a factor analysis of Group I countries produced a loading of 100 on the factor depicting various measures of external public debt (Table 4). In contrast, Group II countries loaded fairly heavily on a factor other than that obtained in the total sample and one that did not represent external public debt in the 1980s. Military expenditures per capita for Group II loaded (Table 5) relatively high at 57 on a factor representing the balance of payments, exports and public consumption, suggesting that the better the export position of the country and the more expansive the public sector in increasing its consumption, the greater the level of military expenditure per capita.

Regressions on per capita military expenditure in 1981 using the total sample (Table 6) indicated that three variables - gross national product per capita (GNPPER), the current account in 1982 (CAB) and the share of public consumption in gross domestic product for 1982 (PCB) account for over 83 per cent of the fluctuations in that measure of military expenditure. Net capital inflows (CMA) in 1970 are also statistically significant and positive, as is the external public debt in 1982 (PDB). However, while the overall regression results appear satisfactory, in terms of the r2, the F statistic and t statistic on individual independent variables, the best regression equation (Equation 4 Table 6) was able to predict only Saudi Arabia's per capita military expenditures within 5 per cent of the actual value (Table 7).

In contrast, the results for Group I countries (Table 8) show a pattern much different from that obtained from the total sample. In addition to gross national product per capita (GNPPER), the government deficit (GDB) as a per cent of GDP in 1982 is highly significant but negative. Countries in the Group I environment have large government deficits apparently used in part to increase military expenditures. The share of defence (GEDB) in the overall government budget is, however, positive and statistically significant, as are the net capital (ECNIA) flows in 1970 and the public debt in 1982 (PDB). Interestingly, the current account of the balance of payments (CAB) is statistically significant but in contrast to Group II countries below, the sign is negative.

One can only speculate at this point, but it appears that Group I countries' external borrowings are in part used to finance military expenditures, as are government deficits, while any improvement in the current account of the balance of payments is appropriated by the private sector for non-defence-related expenditures, and/or by the public sector for external debt servicing or non-military related imports.

Group II countries also follow a pattern considerably

TABLE 9

DETERMINANTS OF MILITARY EXPENDITURE PER CAPITA, GROUP II COUNTRIES, ECONOMIC VARIABLES*

*(Standardised Estimates)

Equation		Independent Variables								Statistics		
	GNPPER	CAB	PCB	PDB	GEDB	GDB	ECNIA	GDP	r^2	F	DF
1 MEP81=	0·21	0·90							·923	102·05	19
	(3·15)	(13·35)									
2	0·19	0·91	0·08						·979	215·33	17
	(4·73)	(22·30)	(1·80)								
3	0·19	0·91	0·07	-0·02					·979	151·10	17
	(4·48)	(21·31)	(1·53)	(-0·38)							
4	0·80		0·43		0·01				·921	35·14	12
	(8·37)		(4·54)		(0·11)						
5	0·56		0·34			0·29			·953	68·13	13
	(3·17)		(4·34)			(2·74)					
6			0·43		0·01	0·80			·921	35·14	12
			(4·54)		(0·11)	(8·37)					
7	0·19	0·91	0·06				-0·03		·979	156·26	17
	(4·48)	(21·82)	(1·28)				(-0·73)				
8	0·19	0·89	0·10					0·04	·980	160·67	17
	(4·67)	(19·34)	(2·03)					(0·95)			

Notes: See text for definition of variables
( ) = t statistic
r^2 = correlation coefficient
F = F statistic
DF = degree of freedom

TABLE 10

DETERMINANTS OF MILITARY EXPENDITURE PER CAPITA, LATIN AMERICAN COUNTRIES, ECONOMIC VARIABLES

(Standardised Estimates)

Equation	Independent Variables								Statistics		
	GNPPER	PCB	GEDB	GDP	PDB	PDA	EB	CAB	r^2	F	DF
1 MEP=81	0·89 (4·23)	0·46 (2·65)	0·66 (3·16)						·726	7·96	12
2	0·88 (5·42)	0·43 (3·35)	0·91 (4·88)	-5·00 (-3·16)	4·65 (3·11)				·887	11·08	12
3	0·91 (4·80)	0·38 (4·47)	0·49 (2·46)	-0·75 (-2·15)		0·69 (2·23)			·843	7·54	12
4	1·71 (6·20)	0·38 (3·78)	0·76 (4·93)	-4·66 (-3·81)	3·87 (3·24)	0·50 (2·42)			·943	16·63	12
5	1·62 (6·66)	0·40 (4·57)	0·58 (3·46)	-4·51 (-4·24)	3·60 (3·45)	0·55 (3·02)	-0·20 (-1·73)		·964	19·41	12
6	1·91 (5·93)	0·28 (2·47)	1·00 (5·28)	-6·81 (-3·69)				-0·41 (-1·60)	·726	7·96	12

Notes: See text for definition of variables
( ) = t statistic
r^2 = correlation coefficient
F = F statistic
DF = degrees of freedom

TABLE 11

DETERMINANTS OF MILITARY EXPENDITURES PER CAPITA, NON-LATIN AMERICAN COUNTRIES, ECONOMIC VARIABLES

(Standardised Estimates)

Equation	Independent Variables								Statistics		
	GNPPER	PCB	GEDB	PDB	CAB	ECNIA	GDP	GDB	r^2	F	DF
1 MEP81 =	0·66 (6·59)								·441	43·48	56
2	0·65 (6·34)	0·30 (2·71)	0·23 (2·13)						·716	22·74	30
3	0·67 (6·67)	0·35 (3·14)	0·13 (1·10)	0·18 (2·62)					·742	18·74	31
4	0·32 (5·34)	0·20 (3·25)		0·20 (3·30)	0·80 (12·73)				·862	58·22	41
5	0·32 (5·05)	0·19 (2·92)			0·78 (12·03)	0·18 (2·90)			·857	52·73	39
6	0·31 (4·61)	0·22 (3·14)			0·71 (9·97)		0·15 (2·07)		·841	48·89	41
7	1·03 (5·78)	0·21 (1·77)						-0·45 (-2·51)	·738	26·29	31

Notes: See text for definition of variables
( ) = t statistic
r^2 = correlation coefficient
F = F statistic
DF = degrees of freedom

different from that of the sample whole (Table 9). Two variables, the gross national product per capita (GNPPER) and the current account of the balance of payments (CAB) account for over 92 per cent of the fluctuation in the per capita military expenditure. The government budget surplus as a per cent of GNP in 1982 (GDB) together with the share of public consumption in 1982 (PCB) also contribute positively to the regression equation. In addition to gross national product per capita, these two variable account for over 95 per cent of the fluctuation in per capita military expenditures. The high correlation between the current account balance (CAB) and government budget position (GDB) precluded including both variables in the regression equation. Nevertheless, a clear contrast appears between this group and Group I. Group II countries appear to maintain much stronger balance of payments positions and are in a position to expand military expenditures when either the current account improves or the government budget improves. These countries do not necessarily have to resort to external loans or inflows of capital to increase expenditures in defence-related activities. All measures of external debt - absolute totals or as a proportion of GNP - were statistically insignificant in accounting for fluctuations in military expenditures per capita.

Examining countries on a regional basis also provides further insights as to the relative importance of economic variables in affecting per capita military expenditures. For example, an analysis of the Latin American sample (Table 10) indicates that gross national product per capita (GNPPER), the share of public consumption in GDP (PCB), the share of military expenditures in the total government budget (GEDB), together with the public external debt in 1970 (PDA) and 1982 (PDB) are all positively related to this measure of military expenditure and statistically significant. Gross domestic product (GDP) was, however, negatively related to per capita military expenditures.

In contrast, the non-Latin American countries (Table 11) followed a pattern similar to the total sample, except that government budget surplus/deficit had a negative sign, indicating that this group of countries resorts more to budget deficits as a means of increasing military expenditure.

In summary, the basic regression equation for total military expenditures per capita shows the following differences by sample group:

	GNPPER	CAB	PCB	PDB	GDB	GEDB	PDA
Total Sample	+	+	+	+	o	+	o
Group I	+	-	o	+	-	+	o
Group II	+	+	o	o	+	o	o
Latin America	+	o	+	+	o	+	+
Non-Latin America	+	+	+	+	-	+	o

Where GNPPER = per capita gross national product, 1982; CAB = current acount balance, 1982; PCB = government consumption as a per cent of GDP, 1982; PDB = total public external debt, 1982; GDB = government deficit (surplus) as a per cent of GNP, 1981; GEDB = share of military expenditure in total government budget, 1981; and PDA = public external debt in 1970.

CONCLUSIONS

While only a first step in examining the determinants of per capita military expenditures, the above analysis did throw considerable light on the four questions posed at the beginning of the study:

1. Wagner's Law (at least on a cross-sectional basis) appears to be valid for developing countries; that is, per capita military expenditures tend to increase in line with increases in per capita income. This result appears valid whether developing countries are examined as a whole, on a broad regional basis (Latin America and non-Latin America), or by degree of resource constraint (relatively financially constrained or unconstrained). On the other hand, per capita income tends to account for only a relatively small proportion of the observed fluctuations in per capita military expenditures irrespective of the group used.

2. Public external debt does appear to have played a significant role in expanding military expenditures per capita, particularly among those countries (Group I) with limited alternative sources of foreign exchange. While not tested here, it may be assumed that, for a number of developing countries, a high proportion of the public external debt accumulated by 1982 had been used to significantly expand military expenditures on a per capita basis.

3. With regard to the uniformity of developing countries, the above analysis clearly indicates significant structural differences by country type. Military expenditures in the poorer, less dynamic countries has been to a large extent facilitated by public external borrowing and domestic public deficits; while the more affluent and dynamic LDCs which spent more on military related activities relied largely on balance of payments and budgetary surpluses to expand their per capita

military expenditure.

1. Significant regional differences in military expenditures may exist, but these differences do not appear to be as pronounced as those occurring between the resource constrained and unconstrained countries. Because of the small sample size for certain regions (i.e., Middle East and South Asia) it was impossible to provide a definitive answer as to the usefulness of a regional approach to explaining the observed patterns of military expenditures.

5. Most importantly, the analysis above indicated the usefulness of examining per capita military expenditures from an economic perspective. Despite the wide diversity of political and strategic situations in our sample of developing countries, economic variables were shown to account for the bulk of differences in per capita military expenditures across countries.

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NOTES

[1] See P.C. Frederiksen and R.E. Looney "Defense Expenditures and Economic Growth in Developing Countries: Some Further Empirical Evidence" Journal of Economic Development (July 1982), pp. 113-125; P.C. Frederiksen and R.E. Looney "Defense Expenditures and Economic Growth in Developing Countries" Armed Forces and Society (Summer 1983) pp. 633-645; P.C. Frederiksen and R.E. Looney, "Another Look at Defense Spending and Economic Growth in Developing Countries" Defense Analysis (Forthcoming 1985), and P.C. Frederiksen and R.E. Looney, "Defense Expenditures and Ecomonic Growth in Developing Countries: A Reply" Armed Forces and Society (Winter 1985) pp.298-301.

[2] P.C. Frederiksen and R.E. Looney "Defense Expenditures and Economic Growth in Developing Countries: Some Further Empirical Evidence" op. cit. p. 117.

[3] Ibid.

[4] Ibid., p. 118.

[5] Ibid.

[6] Ibid.

[7] Ibid., p. 124.

[8] Ibid.

[9] Cf. SAS, op. cit., for a description of this programme. The sample countries were initally assigned an arbitrary one or zero so that placement could be made into two groups. A three-group division of countries did not produce a clear split between the means of the groups, i.e., there was not a high probability of correct placement for each country in one of the three groups.